WHAT IS CLAIMED IS:

1. A surveillance camera apparatus, comprising: a housing assembly having a slanted plate portion with an inner surface; and a camera assembly accommodated in said housing assembly, said slanted plate portion forming part of said housing assembly defining an opening therein, said opening having a central axis thereof, said opening having an imaginary inner surface flush with said inner surface of said slanted plate portion forming part of said housing assembly, and said imaginary inner surface of said opening having the shape of a circle, said camera assembly, including: a stationary member; a pan shaft having a pan axis thereof, said pan shaft being supported by said stationary member to be revolvable around said pan axis; a retaining member integrally formed with said pan shaft; a tilt shaft having a tilt axis thereof, said tilt shaft being retained by said retaining member to be revolvable around said tilt axis under the state that said tilt axis of said tilt shaft is in perpendicular relationship with said pan axis of said pan shaft; an imaging unit for taking an image of a specific object through said opening of said slanted plate portion forming part of said housing assembly, said imaging unit having a light axis thereof, said imaging unit being integrally supported by said tilt shaft under the state that said light axis of said imaging unit is in perpendicular relationship with said tilt axis of said tilt shaft; a pan motor for having said pan shaft driven around said pan axis; a controlling unit for controlling said pan motor to have said imaging unit move around said pan axis of said pan shaft in response to the revolution of said tilt shaft to be driven around said tilt axis.

2. A surveillance camera apparatus as set forth in claim 1, which further comprises a tilt motor for having said tilt shaft driven around said tilt axis, and in which said controlling unit is operative to control said tilt motor to have said imaging unit move around said tilt axis of said tilt shaft in response to the revolution of said pan shaft to be driven around said pan axis.

3. A surveillance camera apparatus as set forth in claim 2, in which said light axis of said imaging unit is in coplanar relationship with said pan axis of said pan shaft on a first imaginary tilt plane, said light axis of said imaging unit being in coplanar relationship with said tilt axis of said tilt shaft on a first imaginary pan plane, said first imaginary tilt plane intersecting a second imaginary tilt plane having said central axis of said opening placed thereon at a pan angle between said first imaginary

tilt plane and said second imaginary tilt plane, said first imaginary pan plane intersecting a second imaginary pan plane having said central axis of said opening placed thereon at a tilt angle between said first imaginary pan plane and said second imaginary pan plane, and in which said controlling unit includes: pan signal producing means for producing a pan signal in association with said revolution of said pan shaft; pan value calculating means for calculating a pan value indicative of said pan angle between said first imaginary tilt plane and said second imaginary tilt plane in response to said pan signal produced by said pan signal producing means; tilt signal producing means for producing a tilt signal in association with said revolution of said tilt shaft; tilt value calculating means for calculating a tilt value indicative of said tilt angle between said first imaginary pan plane and said second imaginary pan plane in response to said tilt signal produced by said tilt signal producing means; upper-limiting pan value storing means for previously storing an upper-limiting pan value in association with said tilt angle between said first imaginary pan plane and said second imaginary pan plane, and outputting said upper-limiting pan value in response to said tilt value calculated by said tilt value calculating means; pan value judging means for judging whether or not said upper-limiting pan value received from said upper-limiting pan value storing means exceeds said pan value calculated by said pan value calculating means based on said tilt value calculated by said tilt value calculating means; pan motor driving means for driving said pan motor to have said pan shaft move around said pan axis of said pan shaft; pan motor controlling means for controlling said pan motor driving means to have said pan motor driving means drive said pan motor based on results judged by said pan value judging means; upper-limiting tilt value storing means for previously storing an upper-limiting tilt value in association with said pan angle between said first imaginary tilt plane and said second imaginary tilt plane, and outputting said upper-limiting tilt value in response to said pan value calculated by said pan value calculating means; tilt value judging means for judging whether or not said upper-limiting tilt value received from said upper-limiting pan value storing means exceeds said tilt value calculated by said tilt value calculating means based on said pan value calculated by said pan value calculating means; tilt motor driving means for driving said tilt motor to have said tilt shaft move around said tilt axis of said tilt shaft; and tilt motor controlling means for controlling said tilt motor driving means to have said tilt motor driving means drive said tilt motor based on results judged by said tilt value judging means.

4. A surveillance camera apparatus as set forth in claim 1, in which said

retaining member is in the form of L–shape in cross-section, and has a first plate portion having a surface paralleled to that of the stationary member and a second plate portion having a surface to be perpendicular to that of said first plate portion with integrally formed with said first plate portion.

5. A surveillance camera apparatus as set forth in claim 4, in which said housing assembly further includes two different portions consisting of vertical and horizontal plate portions each having an inner surface, said vertical plate portion being integrally formed with said slanted plate portion under the state that said inner surface of said vertical plate portion being in face-to-face relationship with said inner surface of said slanted plate portion at a slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion, and said vertical plate portion being integrally formed with said horizontal plate portion under the state that said inner surface of said vertical plate portion being in face-to-face relationship with said inner surface of said horizontal plate portion at a right angle between said inner surface of said vertical plate portion and said inner surface of said horizontal plate portion.

6. A surveillance camera apparatus as set forth in claim 1, in which said housing assembly further includes a hollow hemispherical portion having a central axis, said hollow hemispherical portion being integrally formed with said slanted plate portion under the state that said central axis of said hollow hemispherical portion and said central axis of said opening of said slanted plate portion are axially aligned with each other.

7. A surveillance camera apparatus as set forth in claim 1, in which said stationary member forming part of said camera assembly is securely formed with said horizontal plate portion forming part of said housing assembly under the state that said pan axis of said pan shaft is in coplanar relationship with said central axis of said opening of said slanted plate portion.

8. A surveillance camera apparatus as set forth in claim 7, in which said pan axis of said pan shaft and said central axis of said opening of said slanted plate portion forming part of said housing assembly intersect with each other at said central point of said imaginary inner surface of said opening of said slanted plate portion forming part of said housing assembly.

9. A surveillance camera apparatus as set forth in claim 3, in which said pan motor driving means is operative to assume three different operation states consisting of a first operation state to drive said pan motor to have said imaging unit move clockwise around said pan axis of said pan shaft, a second operation state to drive said pan motor to have said imaging unit move counterclockwise around said pan axis of said pan shaft, and a third operation state to drive said pan motor to have said imaging unit fail to move around said pan axis of said pan shaft.

10. A surveillance camera apparatus as set forth in claim 3, in which said tilt motor driving means is operative to assume three different operation states consisting of a first operation state to drive said tilt motor to have said imaging unit move clockwise around said tilt axis of said tilt shaft, a second operation state to drive said tilt motor to have said imaging unit move counterclockwise around said tilt axis of said tilt shaft, and a third operation state to drive said tilt motor to have said imaging unit fail to move around said tilt axis of said tilt shaft.

11. A surveillance camera apparatus as set forth in claim 9, in which said pan motor controlling means is operative to control said pan motor driving means to have said pan motor driving means assume said third operation state when the judgment is made by said pan value judging means as said pan value calculated by said pan value calculating means being equal to said upper-limiting pan value stored by said upper-limiting pan value storing means.

12. A surveillance camera apparatus as set forth in claim 10, in which said tilt motor controlling means is operative to control said tilt motor driving means to have said tilt motor driving means assume said third operation state when the judgment is made by said tilt value judging means as said tilt value calculated by said tilt value calculating means being equal to said upper-limiting tilt value stored by said upper-limiting tilt value storing means.

13. A surveillance camera apparatus as set forth in claim 9, in which said controlling unit is operably connected to a microcomputer for producing an operation command signal to have said imaging unit automatically move around the pan axis of said pan shaft, and in which said pan motor controlling means is operative to control said pan motor driving means to switch said operation state to be assumed by said pan

motor driving means from one of said first operation state and said second operation state to the other of said first operation state and said second operation state when the judgment is made by said pan value judging means as said pan value calculated by said pan value calculating means being equal to said upper-limiting pan value stored by said upper-limiting pan value storing means.

14. A surveillance camera apparatus as set forth in claim 10, in which said controlling unit 20 is operably connected to a microcomputer for producing an operation command signal to have said imaging unit automatically move around said tilt axis of said tilt shaft, and in which said tilt motor controlling means is operative to control said tilt motor driving means to switch said operation state to be assumed by said tilt motor driving means from one of said first operation state and said second operation state to the other of said first operation state and said second operation state when the judgment is made by said tilt value judging means as said tilt value calculated by said tilt value calculating means being equal to said upper-limiting tilt value stored by said upper-limiting tilt value storing means.

15. A surveillance camera apparatus as set forth in claim 11, in which said upper-limiting pan value storing means is operative to previously further store a mechanically-limited pan value in association with said tilt angle between said first imaginary pan plane and said second imaginary pan plane, said mechanically-limited pan value being larger than said upper-limiting pan value, and in which said pan motor controlling means is operative to control said pan motor driving means to have said pan motor driving means drive said pan motor, and to have said imaging unit move to said mechanically-limited pan value received from said upper-limiting pan value storing means after having said pan motor driving means assume said third operation state.

16. A surveillance camera apparatus as set forth in claim 12, in which said upper-limiting tilt value storing means is operative to previously further store a mechanically-limited tilt value in association with said pan angle between said first imaginary tilt plane and said second imaginary tilt plane, said mechanically-limited tilt value being larger than said upper-limiting tilt angle, and in which said tilt motor controlling means is operative to control said tilt motor driving means to have said tilt motor driving means drive said tilt motor, and to have said imaging unit move to said mechanically-limited tilt value received from said upper-limiting tilt value storing

means after having tilt motor driving means assume said third operation state.

17. A surveillance camera apparatus as set forth in claim 3, in which said upper-limiting pan value storing means is operative to previously store said upper-limiting pan value "Θp" given by a following equation:

$$\Theta p = \pm \text{arccosine} (\tan \theta t \ / \ \tan \theta o)$$

wherein "θt" is indicative of said tilt angle between said first imaginary pan plane and said second imaginary pan plane, and "θo" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.

18. A surveillance camera apparatus as set forth in claim 3, in which said upper-limiting pan value storing means is operative to previously store said upper-limiting pan value "Θp" obtained by approximately calculating along a following equation:

$$\Theta p = \pm \text{arccosine} (\tan \theta t \ / \ \tan \theta o)$$

wherein "θt" is indicative of said tilt angle between said first imaginary pan plane and said second imaginary pan plane, and "θo" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.

19. A surveillance camera apparatus as set forth in claim 3, in which said upper-limiting tilt value storing means is operative to previously store said upper-limiting tilt value "Θt" given by a following equation:

$$\Theta t = \arctan (\cos \theta p \times \tan \theta o)$$

wherein "θp" is indicative of said pan angle between said first imaginary tilt plane and said second imaginary tilt plane, and "θo" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.

20. A surveillance camera apparatus as set forth in claim 3, in which said upper-

limiting tilt value storing means is operative to previously store said upper-limiting tilt value "Θt" obtained by approximately calculating along a following equation:

$$\Theta t = \arctan (\cos \theta p \times \tan \theta o)$$

wherein "θp" is indicative of said pan angle between said first imaginary tilt plane and said second imaginary tilt plane, and "θo" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.

21. A surveillance camera apparatus as set forth in claim 13, in which said pan motor controlling means is operative to produce a pan response signal indicative of said results judged by said pan value judging means, and output said response signal to said microcomputer.

22. A surveillance camera apparatus as set forth in claim 14, in which said tilt motor controlling means is operative to produce a tilt response signal indicative of said results judged by said tilt value judging means, and output said tilt response signal to said microcomputer.

23. A surveillance camera apparatus as set forth in claim 2, in which said light axis of said imaging unit is in coplanar relationship with said pan axis of said pan shaft on a first imaginary tilt plane, said light axis of said imaging unit being in coplanar relationship with said tilt axis of said tilt shaft on a first imaginary pan plane, said first imaginary tilt plane intersecting a second imaginary tilt plane having said central axis of said opening placed thereon at a pan angle between said first imaginary tilt plane and said second imaginary tilt plane, said first imaginary pan plane intersecting a second imaginary pan plane having said central axis of said opening placed thereon at a tilt angle between said first imaginary pan plane and said second imaginary pan plane, and in which said controlling unit includes: pan signal producing means for producing a pan signal in association with said revolution of said pan shaft; pan value calculating means for calculating a pan value indicative of said pan angle between said first imaginary tilt plane and said second imaginary tilt plane in response to said pan signal produced by said pan signal producing means; tilt signal producing means for producing a tilt signal in association with said revolution of said tilt shaft; tilt value calculating means for calculating a tilt value indicative of said tilt

angle between said first imaginary pan plane and said second imaginary pan plane in response to said tilt signal produced by said tilt signal producing means; upper-limiting pan value calculating means for calculating an upper-limiting pan value in association with said tilt angle between said first imaginary pan plane and said second imaginary pan plane; pan value judging means for judging whether or not said upper-limiting pan value calculated by said upper-limiting pan value calculating means exceeds said pan value calculated by said pan value calculating means based on said tilt value calculated by said tilt value calculating means; pan motor driving means for driving said pan motor to have said pan shaft move around said pan axis of said pan shaft; pan motor controlling means for controlling said pan motor driving means to have said pan motor driving means drive said pan motor based on results judged by said pan value judging means; upper-limiting tilt value calculating means for calculating an upper-limiting tilt value in association with said pan angle between said first imaginary tilt plane and said second imaginary tilt plane; tilt value judging means for judging whether or not said upper-limiting tilt value calculated by said upper-limiting pan value calculating means exceeds said tilt value calculated by said tilt value calculating means based on said pan value calculated by said pan value calculating means; tilt motor driving means for driving said tilt motor to have said tilt shaft move around said tilt axis of said tilt shaft; and tilt motor controlling means for controlling said tilt motor driving means to have said tilt motor driving means drive said tilt motor based on results judged by said tilt value judging means.

24. A surveillance camera apparatus as set forth in claim 23, in which said upper-limiting pan value calculating means is operative to calculate said upper-limiting pan value "Θp" given by a following equation:

$$\Theta p = \pm \text{arccosine} (\tan \theta t \ / \ \tan \theta o)$$

wherein "θt" is indicative of said tilt angle between said first imaginary pan plane and said second imaginary pan plane, and "θo" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.

25. A surveillance camera apparatus as set forth in claim 23, in which said upper-limiting pan value calculating means is operative to approximately calculate said upper-limiting pan value "Θp" along a following equation:

$$\Theta p = \pm \text{arccosine} (\tan \theta t \ / \ \tan \theta o)$$

wherein " θ t" is indicative of said tilt angle between said first imaginary pan plane and said second imaginary pan plane, and " θ o" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.

26. A surveillance camera apparatus as set forth in claim 23, in which said upper-limiting tilt value calculating means is operative to calculate said upper-limiting tilt value "Θt" given by a following equation:

$$\Theta t = \arctan (\cos \theta p \times \tan \theta o)$$

wherein " θ p" is indicative of said pan angle between said first imaginary tilt plane and said second imaginary tilt plane, and " θ o" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.

27. A surveillance camera apparatus as set forth in claim 23, in which said upper-limiting tilt value calculating means is operative to approximately calculate said upper-limiting tilt value "Θt" along a following equation:

$$\Theta t = \arctan (\cos \theta p \times \tan \theta o)$$

wherein " θ p" is indicative of said pan angle between said first imaginary tilt plane and said second imaginary tilt plane, and " θ o" is indicative of said first slanted angle between said inner surface of said vertical plate portion and said inner surface of said slanted plate portion.